

PATENT ABSTRACTS OF JAPAN

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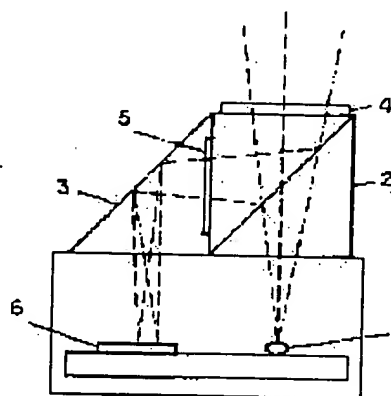
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(54) OPTICAL PICKUP

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an equipment having a means for radiating and detecting a laser light and large signal light intensity by providing a semiconductor laser, a photodetector, a housing, a light separation element, a reflection mirror, a 1/4 wavelength plate and a diffraction grating.

SOLUTION: A semiconductor laser 1 and a photodetector 6 are disposed in the same housing. A polarizing beam splitter 2 is disposed such that its center is coincident with the optical axis of the semiconductor laser 1 on the housing, a reflection mirror 3 is arranged in parallel with the polarizing beam splitter 2 such that a reflection light is made incident vertically on the light receiving element. A 1/4 wavelength plate 4 is provided in the light emitting surface of the polarizing beam splitter 2 while an optical axis is inclined by 45 degrees to the polarizing direction of the semiconductor laser 1. A diffraction grating 5 is provided in a surface opposite a light reflection direction on the reflection surface of the reflection mirror 3 of the polarizing beam splitter 2.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the optical information machines and equipment which it records on an optical disk or can play an optical disk.

[0002]

[Description of the Prior Art] The optical pickup which has the outgoing radiation means and detection means of a laser beam in the conventional optical pickup is explained below. Drawing 7 is the conventional optical element.

[0003] It constitutes in one by becoming the hologram 23 which consists of two fields which lead the light from the semiconductor laser 21 which carries out outgoing radiation of the laser beam, the diffraction grating 22 which divides the light of semiconductor laser into three beams, and an optical disk to a detector in drawing 7 from the photodetector 24 of 5 division photo detector which detects the light from an optical disk, carrying out housing of the photodetector 24 to semiconductor laser 21, and carrying out adhesion immobilization of the cover glass 25 which created the hologram 23 on housing in the optical outgoing radiation side.

[0004] The light which carried out outgoing radiation from semiconductor laser 21 is divided into three beams by the diffraction grating 22, it penetrates a hologram 23, and outgoing radiation is carried out from an optical element, and it reaches an optical disk with subsequent optics. Three beams are diffracted in two fields of a hologram 23, respectively, are led to the photodetector 24 of 5 division photo detector, and are received. this optical pickup -- setting -- Foucault with focal well-known detection -- law -- moreover, truck detection is detected by the well-known 3 beam method.

[0005] Moreover, drawing 8 explains the conventional optical pickup. In drawing 8, the light from semiconductor laser 31 is condensed on an optical disk 36 with an objective lens 35, after having been reflected by the half mirror 32, making it parallel light with a collimator lens 33 and being reflected by the starting mirror 34. It is again collected with an objective lens 35, and is reflected by the starting mirror 34, and the reflected light from an optical disk 36 penetrates a collimator lens 33. After the light which penetrated the collimator lens 33 is refracted by the half mirror 32, it passes along the detection lens 37 and is received with a photodetector 38. In this optical pickup, truck detection is detected by the well-known phase contrast method by the astigmatism method focal detection is well-known again. For this reason, the photodetector 38 consists of two or more photo detectors.

[0006]

[Problem(s) to be Solved by the Invention] In the optical pickup which has the conventional outgoing radiation means and conventional detection means of a laser beam, since the primary diffracted light of a hologram is used in order for the outgoing radiation light which makes an optical disk condense from an optical pickup to penetrate a hologram and to detect the reflected light from an optical disk, signal light reinforcement becomes small.

[0007] moreover -- the conventional optical pickup -- an optic -- light -- it is discrete, and it constitutes, and opts for arrangement of semiconductor laser, a half mirror, and a photo detector in the drawing-in

range of a focal error, and the miniaturization of pickup is difficult.

[0008] This invention solves the above-mentioned conventional trouble, and it aims at offering bleedoff of a laser beam, and the optical pickup which has a detection means.

[0009]

[Means for Solving the Problem] The semiconductor laser to which the optical element of this invention carries out outgoing radiation of the laser beam, and the optical separation component which separates the light of semiconductor laser and the reflective mirror which reflects the light of semiconductor laser, The diffraction grating which consists of two or more fields which lead the light from the quarter-wave length plate which changes the polarization condition of the light of semiconductor laser, and an optical disk to a photodetector, It consists of a photodetector which consists of two or more photo detectors which detect the light from an optical disk. Housing of the photodetector is carried out to semiconductor laser, and an optical separation component and a reflective mirror are arranged on housing at parallel. It is the optical pickup which has the outgoing radiation means and detection means of the laser beam which the quarter-wave length plate prepared in the optical outgoing radiation side of an optical separation component, and constituted in one, and the miniaturization of an optical pickup can be realized.

[0010] Moreover, the outgoing radiation light of this optical pickup can secure sufficient signal light reinforcement with the signal detection method using the transmitted light (zero-order diffracted light) of said diffraction grating while not passing said diffraction grating.

[0011]

[Embodiment of the Invention] Invention of a publication to claim 1 and claims 3-5 of this invention The semiconductor laser which carries out outgoing radiation of the laser beam, and the photodetector which consists of two or more photo detectors in order to detect the reflected light from a disk, Housing which has the part which closes the substrate member which laid semiconductor laser and a photodetector, and semiconductor laser, a photodetector and a substrate member, and a laser beam penetrates, The optical separation component which is arranged at housing, and penetrates according to the deflection side of a laser beam, or is reflected, The reflective mirror in which it is arranged at housing and a reflector reflects the laser beam by which it has been arranged at the separation side of an optical separation component, and parallel, The quarter-wave length plate which is arranged in the optical outgoing radiation side of an optical separation component, and changes the polarization condition of a laser beam, It has the diffraction grating which has two or more fields for leading the reflected light from a disk to a photodetector. It is the optical pickup characterized by housing, the optical separation component, the reflective mirror, the quarter-wave length plate, and the diffraction grating being constituted by one, and the optical pickup which signal strength constituted in the miniaturization greatly can be offered.

[0012] Moreover, invention given in claims 2-5 of this invention The semiconductor laser which carries out outgoing radiation of the laser beam, and the photodetector which consists of two or more photo detectors in order to detect the reflected light from a disk, Housing which has the part which closes the substrate member which laid semiconductor laser and a photodetector, and semiconductor laser, a photodetector and a substrate member, and a laser beam penetrates, The half mirror which is arranged at housing, and penetrates a laser beam, or is reflected, The reflective mirror in which it is arranged at housing and a reflector reflects the laser beam by which it has been arranged at the separation side of an optical separation component, and parallel, It has the diffraction grating which has two or more fields for leading the reflected light from a disk to a photodetector. It is the optical pickup characterized by housing, the half mirror, the reflective mirror, and the diffraction grating being constituted by one, and the optical pickup which signal strength constituted cheaply [it is large and] moreover in a miniaturization can be offered.

[0013] Invention of a publication applies variously the location which forms the diffraction grating of invention according to claim 1 to claims 6-9 of this invention further again. And invention according to claim 10 is an optical disk unit using an optical pickup according to claim 1 or 2.

[0014] (Gestalt 1 of operation) Drawing 1 shows the important section block diagram of the optical

pickup in this invention. The semiconductor laser 1 which carries out outgoing radiation of the laser beam, and the polarization beam splitter 2 which separates the light of semiconductor laser and the mirror 3 which reflects the light of semiconductor laser 1, The diffraction grating 5 which consists of two fields which lead the reflected light from the quarter-wave length plate 4 which changes the linearly polarized light condition of semiconductor laser light into the circular polarization of light, and an optical disk to a detector 6, It is arranged so that the main vertical line which detects the light from an optical disk may be in agreement with the optical axis of light. It separates into a character type quadrissection photo detector 6-A [of the rice field where the direction of a truck of an optical disk and a parting line are parallel, and crosses at right angles] (R> drawing 3 3 reference), and quadrissection photo detector side. It consists of photodetectors 6 in which at least two or more division photo detector 6-B (refer to drawing 3) arranged was formed on the heat sink of one sheet.

[0015] The polarization beam splitter 2 arranged so that housing of the photodetector 6 may be carried out to semiconductor laser 1 and these components of a core may correspond with the optical axis of semiconductor laser 1 on housing, A mirror 3 is arranged so that incidence may be carried out at right angles [the reflected light] to a photo detector in parallel with a polarization beam splitter 2 and. It has the structure which the optical axis leaned the quarter-wave length plate 4 45 degrees to the polarization direction of semiconductor laser 1, prepared in the optical outgoing radiation side of a polarization beam splitter 2, and formed the diffraction grating 5 in the field where the direction in which light is reflected in respect of the reflective mirror of a polarization beam splitter 2 counters, and constitutes in one.

[0016] In addition, a diffraction grating 5 may be formed in any by the side of a mirror 3 or a polarization beam splitter 2.

[0017] Moreover, the circuit which transforms into a voltage signal the current signal acquired by the photodetector 6 may be built in.

[0018] Moreover, a half mirror or half prism may be used instead of a polarization beam splitter 2, and it is not necessary to form the quarter-wave length plate 4.

[0019] A polarization beam splitter 2 is penetrated, the linearly polarized light of semiconductor laser light is changed into the circular polarization of light by the quarter-wave length plate 4, and outgoing radiation of the light from semiconductor laser 1 is carried out from this optical element, and it reaches an optical disk through subsequent optics. Incidence of the reflected light from an optical disk is carried out to this optical pickup by penetrating the quarter-wave length plate 4 again. After being changed into the linearly polarized light of the outgoing radiation light from semiconductor laser 1, and the linearly polarized light which intersects perpendicularly and reflecting by the polarization beam splitter 2, incidence of the incident light which penetrated the quarter-wave length plate 4 is carried out to a diffraction grating 5. The transmitted light (zero-order diffracted light) of a diffraction grating 5 reaches handwriting type quadrissection photo detector 6-A of Nochida reflected by the reflective mirror 3.

[0020] On the other hand, the primary diffracted light of a diffraction grating 5 is led to division photo detector 6-B arranged by separating into the handwriting type quadrissection photo detector 6-A side of Nochida reflected by the reflective mirror 3, and is received. Drawing 2 shows the configuration of a diffraction grating 5 here, and drawing 3 shows the configuration of a photodetector 6 and indicates the case where photo detector 6-B arranged by dissociating is two division to be character type quadrissection photo detector 6-A of a rice field. It condenses on the main parting line of 2 division photo detector 6-B at the time of a focus, a diffraction grating 5 consists of two fields, the primary diffracted light from a field 1 or a field 2 is moved to a photo detector E side from the core of 2 division photo detector 6-B, when an optical disk keeps away, and when an optical disk approaches reverse, it moves to a photo detector F side.

[0021] In the above actuation, a RF signal is detected from the total which transformed into the voltage signal the current output detected by character type quadrissection photo detector 6-A of a rice field, and a tracking error signal is detected by changing each sum voltage signal (A+C) of the photo detector of the vertical angle of character type quadrissection photo detector 6-A of a rice field, and (B+D) into a digital wave with a comparator, respectively, and changing the pulse according to those phase contrast into an analog wave through an integrating circuit. Moreover, the difference signal of 2 division photo

detector 6-B detects a focal error signal.

[0022] (Gestalt 2 of operation) Drawing 4 shows the important section block diagram of the optical pickup in the gestalt of the 2nd operation in this invention. The semiconductor laser 1 which carries out outgoing radiation of the laser beam in drawing 4 (a), the polarization beam splitter 2 which separates the light of semiconductor laser, and the reflective mirror 3 which reflects the light of semiconductor laser 1, The diffraction grating 5 which consists of two fields which lead the light from the quarter-wave length plate 4 which changes the linearly polarized light condition of the light of semiconductor laser 1 into the circular polarization of light, and an optical disk to a detector, It is arranged so that the main vertical line which detects the light from an optical disk may be in agreement with the optical axis of light. It consists of photodetectors 6 with which a parting line consists of photo detector 6-B currently divided or more into at least two arranged by separating into the character type quadrisection photo detector 6-A [of the rice field which is parallel and intersects perpendicularly with the direction of a truck of an optical disk], and quadrisection photo detector 6-A side.

[0023] As for components, such as this, housing of the photodetector 6 is carried out to semiconductor laser 1. The reflective mirror 3 is arranged at the polarization beam splitter 2, the polarization beam splitter 2, and parallel which have been arranged so that a core may be in agreement with the optical axis of semiconductor laser 1 on housing. It has the structure which the optical axis leaned the quarter-wave length plate 4 45 degrees to the polarization direction of semiconductor laser 1, prepared in the optical outgoing radiation side of a polarization beam splitter 2, and formed the diffraction grating 5 in the underside of the reflective mirror 3 which touches a housing side, and constitutes in one.

[0024] In addition, a diffraction grating 5 may be formed in any by the side of a mirror 3 or housing (for example, glass window prepared in the can). When it forms especially in a housing side, a polarization beam splitter 2 and a mirror 3 can be formed in one. Moreover, you may make it the structure which could build in the circuit which transforms into a voltage signal the current signal acquired by the photodetector 6 in drawing 4 (b), and replaced arrangement of a polarization beam splitter 2 and the reflective mirror 3. Furthermore, a half mirror or half prism may be used instead of a polarization beam splitter 2, and it is not necessary to form the quarter-wave length plate 4.

[0025] A polarization beam splitter 2 is penetrated, the linearly polarized light of the light of semiconductor laser 1 is changed into the circular polarization of light by the quarter-wave length plate 4, from this optical pickup, outgoing radiation of the light from semiconductor laser 1 is carried out, and it reaches an optical disk through the optical path mentioned later. Incidence of the reflected light from an optical disk is carried out to this optical pickup by penetrating the quarter-wave length plate 4 again. After being changed into the linearly polarized light of the outgoing radiation light from semiconductor laser 1, and the linearly polarized light which intersects perpendicularly, reflecting by the polarization beam splitter 2 and being further reflected by the reflective mirror 3, incidence of the incident light which penetrated the quarter-wave length plate 4 is carried out to a diffraction grating 5. The transmitted light (zero-order diffracted light) of a diffraction grating 5 reaches character type quadrisection photo detector 6-A of a rice field. On the other hand, the primary diffracted light of a diffraction grating 5 is led to division photo detector 6-B arranged by separating into the character type quadrisection photo detector 6-A side of a rice field, and is received.

[0026] A signal is detected like the gestalt 1 of operation below. Moreover, as shown in drawing 4 (c), the reflective mold diffraction grating 40 may be formed in the slant face of a mirror 3. It is that the cost is cut down by forming a polarization beam splitter 2 and a mirror in one especially in this case.

[0027] (Gestalt 3 of operation) Next, the gestalt of the 3rd operation is explained using drawing 5. Drawing 5 is the general drawing of the optical pickup which rises with the optical pickup 8 of this invention, and is constituted with a mirror 9 and two objective lenses 10 and 11. In order that one [in drawing] objective lens 10 may read the information on CD optical disk, another objective lens 11 is for reading the information on SD optical disk, and is mechanically switched according to an optical disk. The laser beam by which outgoing radiation was carried out from the optical pickup of this invention is condensed by the optical disk 12 with an objective lens 10 or an objective lens 11 according to the optical disk to read, after being reflected by the starting mirror 9. After penetrating an objective lens 10

or an objective lens 11 again and being reflected by the starting mirror 9, incidence of the reflected light from an optical disk 12 is carried out to an optical pickup 8. The light which carried out incidence to the optical pickup 8 can read the signal from an optical disk 12 like the actuation explained with the gestalt 1 of operation.

[0028] (Gestalt 4 of operation) Next, the gestalt of the 4th operation is explained using drawing 6.

Drawing 6 is an optical pickup which rises with the optical pickup 13 of this invention, and a collimator lens 14, and is constituted with the reflective mirror 15 and two objective lenses 16 and 17. In order that one [in drawing] objective lens 16 may read the information on CD optical disk, another objective lens 17 is for reading the information on SD optical disk, and is mechanically switched according to an optical disk. After the laser beam by which outgoing radiation was carried out from this optical element 13 is changed into parallel light by the collimator lens 14, it is condensed by the optical disk 18 with an objective lens 16 or an objective lens 17 according to the optical disk which it is reflected by the starting mirror 15 and read. After penetrating an objective lens 16 or an objective lens 17 again and being reflected by the starting mirror 15, the reflected light from an optical disk 18 penetrates a collimator lens 14, and it carries out incidence to an optical element 13. The light which carried out incidence to the optical element 13 can read the signal from an optical disk 18 by actuation explained with (the gestalt 1 of operation). In addition, when not forming a quarter-wave length plate in an optical element 13, a quarter-wave length plate may be inserted in the middle of an optical element and an objective lens.

[0029] Moreover, the optical disk unit by which actuation was stabilized can be offered by using for an optical disk unit the optical pickup constituted as mentioned above.

[0030]

[Effect of the Invention] As mentioned above, according to this invention, since a RF signal and a tracking error signal are detected using the zero-order diffracted light, it becomes possible to offer the optical pickup which can secure small and sufficient signal strength. And the optical disk unit by which actuation was stabilized can be offered.

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the optical information machines and equipment which it records on an optical disk or can play an optical disk.

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PRIOR ART

[Description of the Prior Art] The optical pickup which has the outgoing radiation means and detection means of a laser beam in the conventional optical pickup is explained below. Drawing 7 is the conventional optical element.

[0003] It constitutes in one by becoming the hologram 23 which consists of two fields which lead the light from the semiconductor laser 21 which carries out outgoing radiation of the laser beam, the diffraction grating 22 which divides the light of semiconductor laser into three beams, and an optical disk to a detector in drawing 7 from the photodetector 24 of 5 division photo detector which detects the light from an optical disk, carrying out housing of the photodetector 24 to semiconductor laser 21, and carrying out adhesion immobilization of the cover glass 25 which created the hologram 23 on housing in the optical outgoing radiation side.

[0004] The light which carried out outgoing radiation from semiconductor laser 21 is divided into three beams by the diffraction grating 22, it penetrates a hologram 23, and outgoing radiation is carried out from an optical element, and it reaches an optical disk with subsequent optics. Three beams are diffracted in two fields of a hologram 23, respectively, are led to the photodetector 24 of 5 division photo detector, and are received. this optical pickup -- setting -- Foucault with focal well-known detection -- law -- moreover, truck detection is detected by the well-known 3 beam method.

[0005] Moreover, drawing 8 explains the conventional optical pickup. In drawing 8, the light from semiconductor laser 31 is condensed on an optical disk 36 with an objective lens 35, after having been reflected by the half mirror 32, making it parallel light with a collimator lens 33 and being reflected by the starting mirror 34. It is again collected with an objective lens 35, and is reflected by the starting mirror 34, and the reflected light from an optical disk 36 penetrates a collimator lens 33. After the light which penetrated the collimator lens 33 is refracted by the half mirror 32, it passes along the detection lens 37 and is received with a photodetector 38. In this optical pickup, truck detection is detected by the well-known phase contrast method by the astigmatism method focal detection is well-known again. For this reason, the photodetector 38 consists of two or more photo detectors.

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EFFECT OF THE INVENTION

[Effect of the Invention] As mentioned above, according to this invention, since a RF signal and a tracking error signal are detected using the zero-order diffracted light, it becomes possible to offer the optical pickup which can secure small and sufficient signal strength. And the optical disk unit by which actuation was stabilized can be offered.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] In the optical pickup which has the conventional outgoing radiation means and conventional detection means of a laser beam, since the primary diffracted light of a hologram is used in order for the outgoing radiation light which makes an optical disk condense from an optical pickup to penetrate a hologram and to detect the reflected light from an optical disk, signal light reinforcement becomes small.

[0007] moreover -- the conventional optical pickup -- an optic -- light -- it is discrete, and it constitutes, and opts for arrangement of semiconductor laser, a half mirror, and a photo detector in the drawing-in range of a focal error, and the miniaturization of pickup is difficult.

[0008] This invention solves the above-mentioned conventional trouble, and it aims at offering bleedoff of a laser beam, and the optical pickup which has a detection means.

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MEANS

[Means for Solving the Problem] The semiconductor laser to which the optical element of this invention carries out outgoing radiation of the laser beam, and the optical separation component which separates the light of semiconductor laser and the reflective mirror which reflects the light of semiconductor laser, The diffraction grating which consists of two or more fields which lead the light from the quarter-wave length plate which changes the polarization condition of the light of semiconductor laser, and an optical disk to a photodetector, It consists of a photodetector which consists of two or more photo detectors which detect the light from an optical disk. Housing of the photodetector is carried out to semiconductor laser, and an optical separation component and a reflective mirror are arranged on housing at parallel. It is the optical pickup which has the outgoing radiation means and detection means of the laser beam which the quarter-wave length plate prepared in the optical outgoing radiation side of an optical separation component, and constituted in one, and the miniaturization of an optical pickup can be realized.

[0010] Moreover, the outgoing radiation light of this optical pickup can secure sufficient signal light reinforcement with the signal detection method using the transmitted light (zero-order diffracted light) of said diffraction grating while not passing said diffraction grating.

[0011]

[Embodiment of the Invention] Invention of a publication to claim 1 and claims 3-5 of this invention The semiconductor laser which carries out outgoing radiation of the laser beam, and the photodetector which consists of two or more photo detectors in order to detect the reflected light from a disk, Housing which has the part which closes the substrate member which laid semiconductor laser and a photodetector, and semiconductor laser, a photodetector and a substrate member, and a laser beam penetrates, The optical separation component which is arranged at housing, and penetrates according to the deflection side of a laser beam, or is reflected, The reflective mirror in which it is arranged at housing and a reflector reflects the laser beam by which it has been arranged at the separation side of an optical separation component, and parallel, The quarter-wave length plate which is arranged in the optical outgoing radiation side of an optical separation component, and changes the polarization condition of a laser beam, It has the diffraction grating which has two or more fields for leading the reflected light from a disk to a photodetector. It is the optical pickup characterized by housing, the optical separation component, the reflective mirror, the quarter-wave length plate, and the diffraction grating being constituted by one, and the optical pickup which signal strength constituted in the miniaturization greatly can be offered.

[0012] Moreover, invention given in claims 2-5 of this invention The semiconductor laser which carries out outgoing radiation of the laser beam, and the photodetector which consists of two or more photo detectors in order to detect the reflected light from a disk, Housing which has the part which closes the substrate member which laid semiconductor laser and a photodetector, and semiconductor laser, a photodetector and a substrate member, and a laser beam penetrates, The half mirror which is arranged at housing, and penetrates a laser beam, or is reflected, The reflective mirror in which it is arranged at housing and a reflector reflects the laser beam by which it has been arranged at the separation side of an

optical separation component, and parallel, It has the diffraction grating which has two or more fields for leading the reflected light from a disk to a photodetector. It is the optical pickup characterized by housing, the half mirror, the reflective mirror, and the diffraction grating being constituted by one, and the optical pickup which signal strength constituted cheaply [it is large and] moreover in a miniaturization can be offered.

[0013] Invention of a publication applies variously the location which forms the diffraction grating of invention according to claim 1 to claims 6-9 of this invention further again. And invention according to claim 10 is an optical disk unit using an optical pickup according to claim 1 or 2.

[0014] (Gestalt 1 of operation) Drawing 1 shows the important section block diagram of the optical pickup in this invention. The semiconductor laser 1 which carries out outgoing radiation of the laser beam, and the polarization beam splitter 2 which separates the light of semiconductor laser and the mirror 3 which reflects the light of semiconductor laser 1, The diffraction grating 5 which consists of two fields which lead the reflected light from the quarter-wave length plate 4 which changes the linearly polarized light condition of semiconductor laser light into the circular polarization of light, and an optical disk to a detector 6, It is arranged so that the main vertical line which detects the light from an optical disk may be in agreement with the optical axis of light. It separates into a character type quadrisection photo detector 6-A [of the rice field where the direction of a truck of an optical disk and a parting line are parallel, and crosses at right angles] (R> drawing 3 3 reference), and quadrisection photo detector side. It consists of photodetectors 6 in which at least two or more division photo detector 6-B (refer to drawing 3) arranged was formed on the heat sink of one sheet.

[0015] The polarization beam splitter 2 arranged so that housing of the photodetector 6 may be carried out to semiconductor laser 1 and these components of a core may correspond with the optical axis of semiconductor laser 1 on housing, A mirror 3 is arranged so that incidence may be carried out at right angles [the reflected light] to a photo detector in parallel with a polarization beam splitter 2 and. It has the structure which the optical axis leaned the quarter-wave length plate 4 45 degrees to the polarization direction of semiconductor laser 1, prepared in the optical outgoing radiation side of a polarization beam splitter 2, and formed the diffraction grating 5 in the field where the direction in which light is reflected in respect of the reflective mirror of a polarization beam splitter 2 counters, and constitutes in one.

[0016] In addition, a diffraction grating 5 may be formed in any by the side of a mirror 3 or a polarization beam splitter 2.

[0017] Moreover, the circuit which transforms into a voltage signal the current signal acquired by the photodetector 6 may be built in.

[0018] Moreover, a half mirror or half prism may be used instead of a polarization beam splitter 2, and it is not necessary to form the quarter-wave length plate 4.

[0019] A polarization beam splitter 2 is penetrated, the linearly polarized light of semiconductor laser light is changed into the circular polarization of light by the quarter-wave length plate 4, and outgoing radiation of the light from semiconductor laser 1 is carried out from this optical element, and it reaches an optical disk through subsequent optics. Incidence of the reflected light from an optical disk is carried out to this optical pickup by penetrating the quarter-wave length plate 4 again. After being changed into the linearly polarized light of the outgoing radiation light from semiconductor laser 1, and the linearly polarized light which intersects perpendicularly and reflecting by the polarization beam splitter 2, incidence of the incident light which penetrated the quarter-wave length plate 4 is carried out to a diffraction grating 5. The transmitted light (zero-order diffracted light) of a diffraction grating 5 reaches handwriting type quadrisection photo detector 6-A of Nochida reflected by the reflective mirror 3.

[0020] On the other hand, the primary diffracted light of a diffraction grating 5 is led to division photo detector 6-B arranged by separating into the handwriting type quadrisection photo detector 6-A side of Nochida reflected by the reflective mirror 3, and is received. Drawing 2 shows the configuration of a diffraction grating 5 here, and drawing 3 shows the configuration of a photodetector 6 and indicates the case where photo detector 6-B arranged by dissociating is two division to be character type quadrisection photo detector 6-A of a rice field. It condenses on the main parting line of 2 division photo detector 6-B at the time of a focus, a diffraction grating 5 consists of two fields, the primary diffracted

light from a field 1 or a field 2 is moved to a photo detector E side from the core of 2 division photo detector 6-B, when an optical disk keeps away, and when an optical disk approaches reverse, it moves to a photo detector F side.

[0021] In the above actuation, a RF signal is detected from the total which transformed into the voltage signal the current output detected by character type quadrissection photo detector 6-A of a rice field, and a tracking error signal is detected by changing each sum voltage signal (A+C) of the photo detector of the vertical angle of character type quadrissection photo detector 6-A of a rice field, and (B+D) into a digital wave with a comparator, respectively, and changing the pulse according to those phase contrast into an analog wave through an integrating circuit. Moreover, the difference signal of 2 division photo detector 6-B detects a focal error signal.

[0022] (Gestalt 2 of operation) Drawing 4 shows the important section block diagram of the optical pickup in the gestalt of the 2nd operation in this invention. The semiconductor laser 1 which carries out outgoing radiation of the laser beam in drawing 4 (a), the polarization beam splitter 2 which separates the light of semiconductor laser, and the reflective mirror 3 which reflects the light of semiconductor laser 1, The diffraction grating 5 which consists of two fields which lead the light from the quarter-wave length plate 4 which changes the linearly polarized light condition of the light of semiconductor laser 1 into the circular polarization of light, and an optical disk to a detector, It is arranged so that the main vertical line which detects the light from an optical disk may be in agreement with the optical axis of light. It consists of photodetectors 6 with which a parting line consists of photo detector 6-B currently divided or more into at least two arranged by separating into the character type quadrissection photo detector 6-A [of the rice field which is parallel and intersects perpendicularly with the direction of a truck of an optical disk], and quadrissection photo detector 6-A side.

[0023] As for components, such as this, housing of the photodetector 6 is carried out to semiconductor laser 1. The reflective mirror 3 is arranged at the polarization beam splitter 2, the polarization beam splitter 2, and parallel which have been arranged so that a core may be in agreement with the optical axis of semiconductor laser 1 on housing. It has the structure which the optical axis leaned the quarter-wave length plate 4 45 degrees to the polarization direction of semiconductor laser 1, prepared in the optical outgoing radiation side of a polarization beam splitter 2, and formed the diffraction grating 5 in the underside of the reflective mirror 3 which touches a housing side, and constitutes in one.

[0024] In addition, a diffraction grating 5 may be formed in any by the side of a mirror 3 or housing (for example, glass window prepared in the can). When it forms especially in a housing side, a polarization beam splitter 2 and a mirror 3 can be formed in one. Moreover, you may make it the structure which could build in the circuit which transforms into a voltage signal the current signal acquired by the photodetector 6 in drawing 4 (b), and replaced arrangement of a polarization beam splitter 2 and the reflective mirror 3. Furthermore, a half mirror or half prism may be used instead of a polarization beam splitter 2, and it is not necessary to form the quarter-wave length plate 4.

[0025] A polarization beam splitter 2 is penetrated, the linearly polarized light of the light of semiconductor laser 1 is changed into the circular polarization of light by the quarter-wave length plate 4, from this optical pickup, outgoing radiation of the light from semiconductor laser 1 is carried out, and it reaches an optical disk through the optical path mentioned later. Incidence of the reflected light from an optical disk is carried out to this optical pickup by penetrating the quarter-wave length plate 4 again. After being changed into the linearly polarized light of the outgoing radiation light from semiconductor laser 1, and the linearly polarized light which intersects perpendicularly, reflecting by the polarization beam splitter 2 and being further reflected by the reflective mirror 3, incidence of the incident light which penetrated the quarter-wave length plate 4 is carried out to a diffraction grating 5. The transmitted light (zero-order diffracted light) of a diffraction grating 5 reaches character type quadrissection photo detector 6-A of a rice field. On the other hand, the primary diffracted light of a diffraction grating 5 is led to division photo detector 6-B arranged by separating into the character type quadrissection photo detector 6-A side of a rice field, and is received.

[0026] A signal is detected like the gestalt 1 of operation below. Moreover, as shown in drawing 4 (c), the reflective mold diffraction grating 40 may be formed in the slant face of a mirror 3. It is that the cost

is cut down by forming a polarization beam splitter 2 and a mirror in one especially in this case.

[0027] (Gestalt 3 of operation) Next, the gestalt of the 3rd operation is explained using drawing 5.

Drawing 5 is the general drawing of the optical pickup which rises with the optical pickup 8 of this invention, and is constituted with a mirror 9 and two objective lenses 10 and 11. In order that one [in drawing] objective lens 10 may read the information on CD optical disk, another objective lens 11 is for reading the information on SD optical disk, and is mechanically switched according to an optical disk. The laser beam by which outgoing radiation was carried out from the optical pickup of this invention is condensed by the optical disk 12 with an objective lens 10 or an objective lens 11 according to the optical disk to read, after being reflected by the starting mirror 9. After penetrating an objective lens 10 or an objective lens 11 again and being reflected by the starting mirror 9, incidence of the reflected light from an optical disk 12 is carried out to an optical pickup 8. The light which carried out incidence to the optical pickup 8 can read the signal from an optical disk 12 like the actuation explained with the gestalt 1 of operation.

[0028] (Gestalt 4 of operation) Next, the gestalt of the 4th operation is explained using drawing 6.

Drawing 6 is an optical pickup which rises with the optical pickup 13 of this invention, and a collimator lens 14, and is constituted with the reflective mirror 15 and two objective lenses 16 and 17. In order that one [in drawing] objective lens 16 may read the information on CD optical disk, another objective lens 17 is for reading the information on SD optical disk, and is mechanically switched according to an optical disk. After the laser beam by which outgoing radiation was carried out from this optical element 13 is changed into parallel light by the collimator lens 14, it is condensed by the optical disk 18 with an objective lens 16 or an objective lens 17 according to the optical disk which it is reflected by the starting mirror 15 and read. After penetrating an objective lens 16 or an objective lens 17 again and being reflected by the starting mirror 15, the reflected light from an optical disk 18 penetrates a collimator lens 14, and it carries out incidence to an optical element 13. The light which carried out incidence to the optical element 13 can read the signal from an optical disk 18 by actuation explained with (the gestalt 1 of operation). In addition, when not forming a quarter-wave length plate in an optical element 13, a quarter-wave length plate may be inserted in the middle of an optical element and an objective lens.

[0029] Moreover, the optical disk unit by which actuation was stabilized can be offered by using for an optical disk unit the optical pickup constituted as mentioned above.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The important section block diagram of the optical pickup in this invention

[Drawing 2] Drawing showing the configuration of the diffraction grating in this invention

[Drawing 3] Drawing showing the configuration of the photodetector in this invention

[Drawing 4] The important section block diagram of the optical pickup in this invention

[Drawing 5] The whole optical pickup block diagram by the optical pickup in this invention

[Drawing 6] The whole optical pickup block diagram by the optical element in this invention

[Drawing 7] The block diagram of the conventional optical element

[Drawing 8] The block diagram of the conventional optical pickup

[Description of Notations]

1, 21, 31 Semiconductor laser

2 Polarization Beam Splitter

3 Reflective Mirror

4 Quarter-wave Length Plate

5 22 Diffraction grating

6, 24, 38 Photodetector

8 13 Optical pickup

9, 15, 34 Starting mirror

10, 11, 16, 17, 35 Objective lens

12, 18, 36 Optical disk

14 33 Collimator lens

23 Hologram

25 Cover Glass

32 Half Mirror

37 Detection Lens

40 Reflex Diffraction Grating

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CLAIMS

[Claim(s)]

[Claim 1] The semiconductor laser which is the optical pickup which records information on a disk-like record medium, or reproduces information, and carries out outgoing radiation of the laser beam, The photodetector which consists of two or more photo detectors in order to detect the reflected light from a disk, Housing which has the part which closes the substrate member which laid said semiconductor laser and photodetector, and said semiconductor laser, photodetector and substrate member, and a laser beam penetrates, The optical separation component which is arranged at said housing, and penetrates according to the deflection side of a laser beam, or is reflected, The reflective mirror in which it is arranged at said housing and a reflector reflects the laser beam by which it has been arranged at the separation side of said optical separation component, and parallel, The quarter-wave length plate which is arranged in the optical outgoing radiation side of said optical separation component, and changes the polarization condition of a laser beam, The optical pickup characterized by having the diffraction grating which has two or more fields for leading the reflected light from a disk to said photodetector, and said housing, said optical separation component, said reflective mirror, said quarter-wave length plate, and said diffraction grating being constituted by one.

[Claim 2] The semiconductor laser which is the optical pickup which records information on a disk-like record medium, or reproduces information, and carries out outgoing radiation of the laser beam, The photodetector which consists of two or more photo detectors in order to detect the reflected light from a disk, Housing which has the part which closes the substrate member which laid said semiconductor laser and photodetector, and said semiconductor laser, photodetector and substrate member, and a laser beam penetrates, The half mirror which is arranged at said housing, and penetrates a laser beam, or is reflected, The reflective mirror in which it is arranged at said housing and a reflector reflects the laser beam by which it has been arranged at the separation side of said optical separation component, and parallel, The optical pickup characterized by having the diffraction grating which has two or more fields for leading the reflected light from a disk to said photodetector, and said housing, said half mirror, said reflective mirror, and said diffraction grating being constituted by one.

[Claim 3] Said diffraction grating is an optical pickup according to claim 1 or 2 characterized by having two fields.

[Claim 4] Said photodetector is an optical pickup according to claim 1 or 2 characterized by having the photo detector which has been arranged so that the detection side may accomplish the optical axis and perpendicular of the reflected light from a disk, and was quadrisected by the character type of a rice field, and the photo detector which has been arranged in the location which only a necessary distance isolated from said quadrisected photo detector, and was used as the character type of 2 at least 2 ****s, and having been arranged at the heat sink of one sheet.

[Claim 5] Said photodetector is an optical pickup according to claim 4 characterized by detecting the zero-order diffracted light of said diffraction grating by said quadrisected photo detector, and detecting the primary diffracted light of said diffraction grating by said photo detector carried out 2 ****s.

[Claim 6] Said diffraction grating is an optical pickup according to claim 1 which is the plane of

composition of said optical separation component and said reflective mirror, and is characterized by forming in said reflective mirror side.

[Claim 7] Said diffraction grating is an optical pickup according to claim 1 which is the plane of composition of said optical separation component and said reflective mirror, and is characterized by forming in said optical separation component side.

[Claim 8] Said diffraction grating is an optical pickup according to claim 1 which is the plane of composition of said reflective mirror and said housing, and is characterized by forming in said reflective mirror side.

[Claim 9] Said diffraction grating is an optical pickup according to claim 1 which is the plane of composition of said reflective mirror and said housing, and is characterized by forming in said housing side.

[Claim 10] The optical disk unit which has an optical pickup according to claim 1 or 2.

[Translation done.]

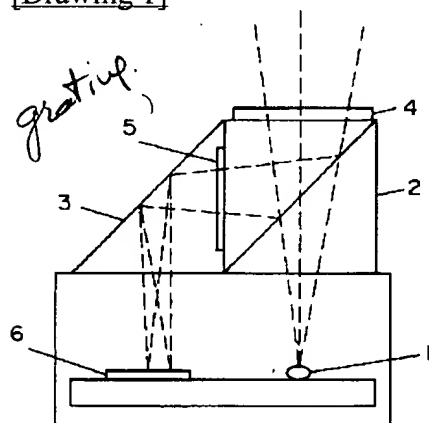
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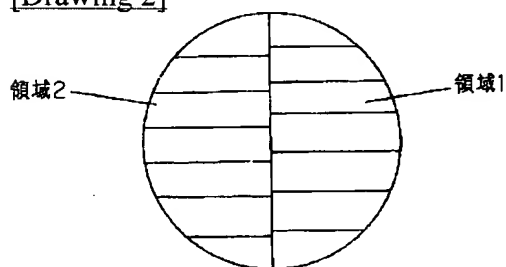
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DRAWINGS

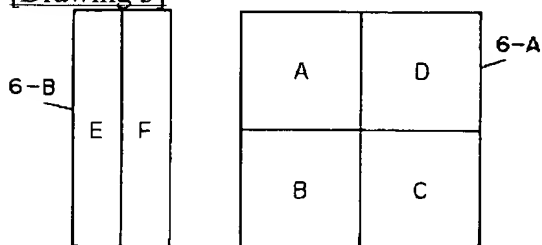
[Drawing 1]



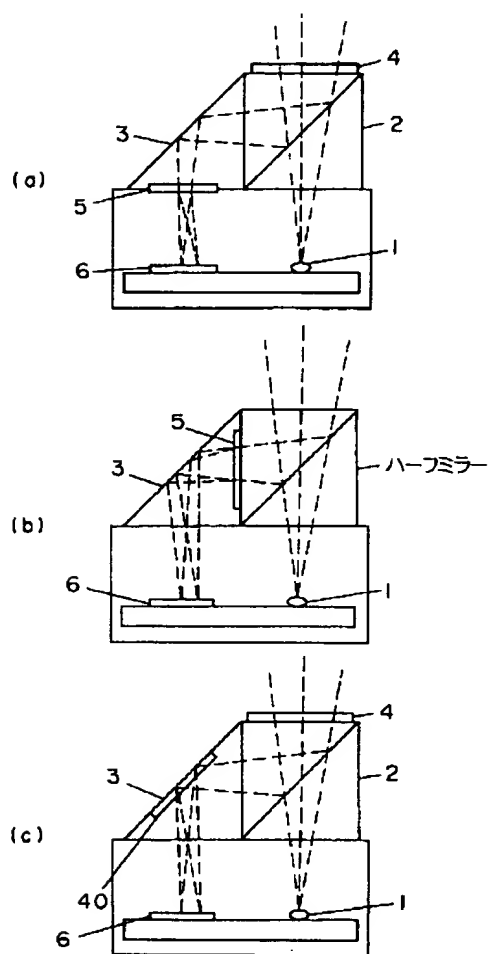
[Drawing 2]



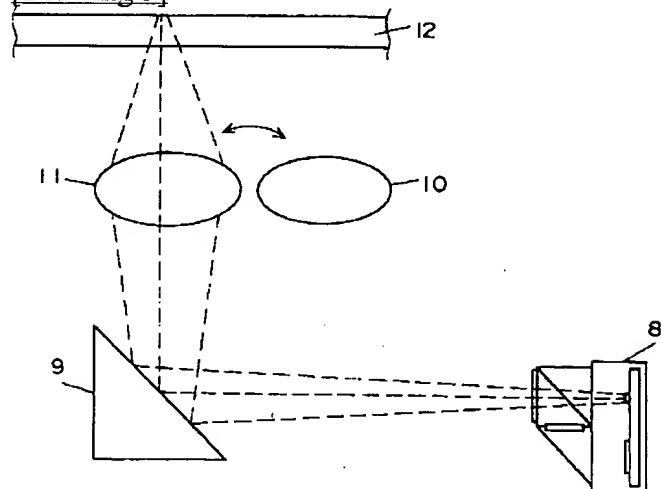
[Drawing 3]



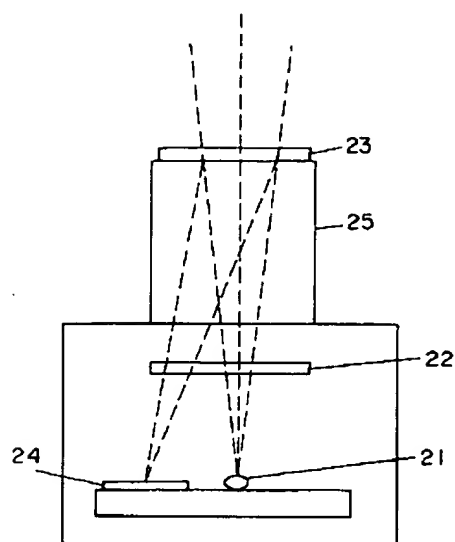
[Drawing 4]



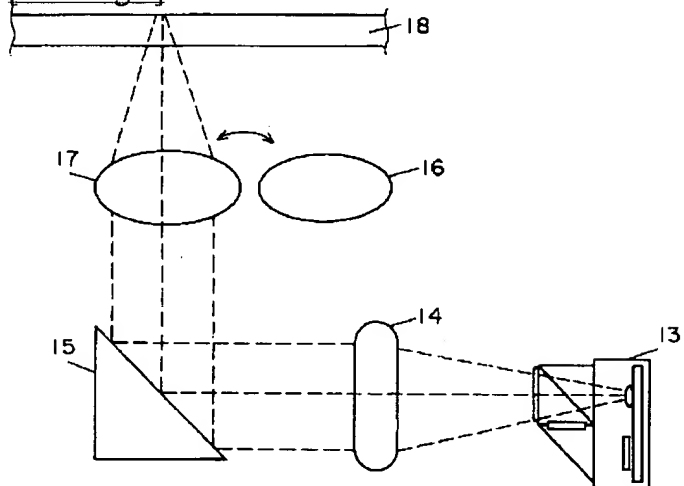
[Drawing 5]



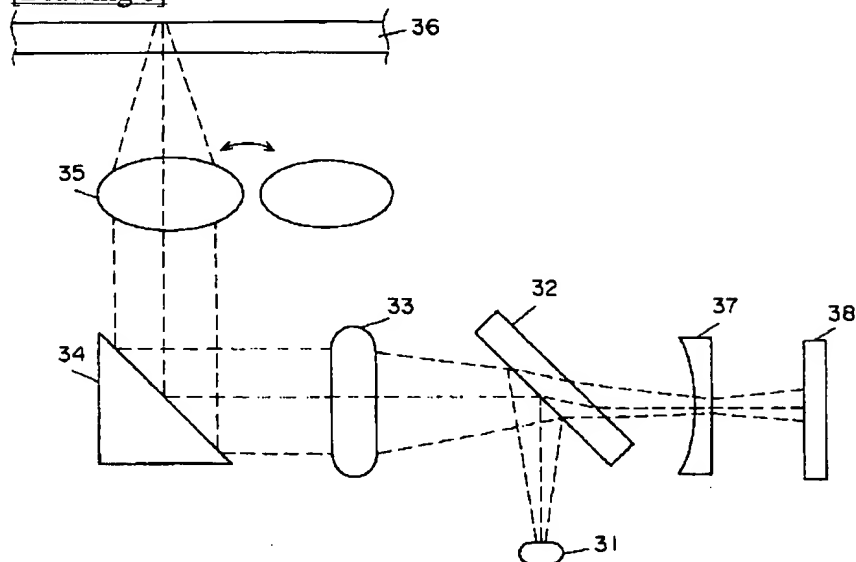
[Drawing 7]



[Drawing 6]



[Drawing 8]



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